

THE EXPERIMENTAL INFESTATION OF *PHYSOPSIS AFRICANA*

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Some notes on the experimental infestation of *Physopsis africana* in Natal may prove of use for reference to workers in other parts of the world who are engaged in the study of the life-history of the schistosomes.

It was some time before I succeeded in keeping this common fresh-water snail alive for any length of time under artificial conditions. The glass jars in which I observed the growth of young examples proved unsuitable for more than a few days; but wooden tubs, kept out of doors in a shady place, answered the purpose very well, and I was able to secure all I needed whilst the experiments were in progress. I did not find it necessary to change the water in the tubs, which contained a few water-plants and an increasing amount of decomposing leaves and small pieces of wood which fell in occasionally. The snails had, therefore, plenty of shade, whilst the water never became too hot, as it tends to do in a glass jar if placed in the sun. As 'millions' had been observed feeding on young snails, and as one did not wish to interfere in any way with the free ventilation of the water, nothing was done to prevent the breeding of mosquitoes. The surface area of the water was approximately double that of the bottom of the tubs.

It is possible that the rate of growth was handicapped by the food supply—and I have not succeeded in getting the common variety of water-lily to thrive in wooden tubs—but, even under what appear to be very favourable conditions, I do not find it possible to obtain examples large enough for experimental purposes under five months in Natal, and I should gather that by far the majority of

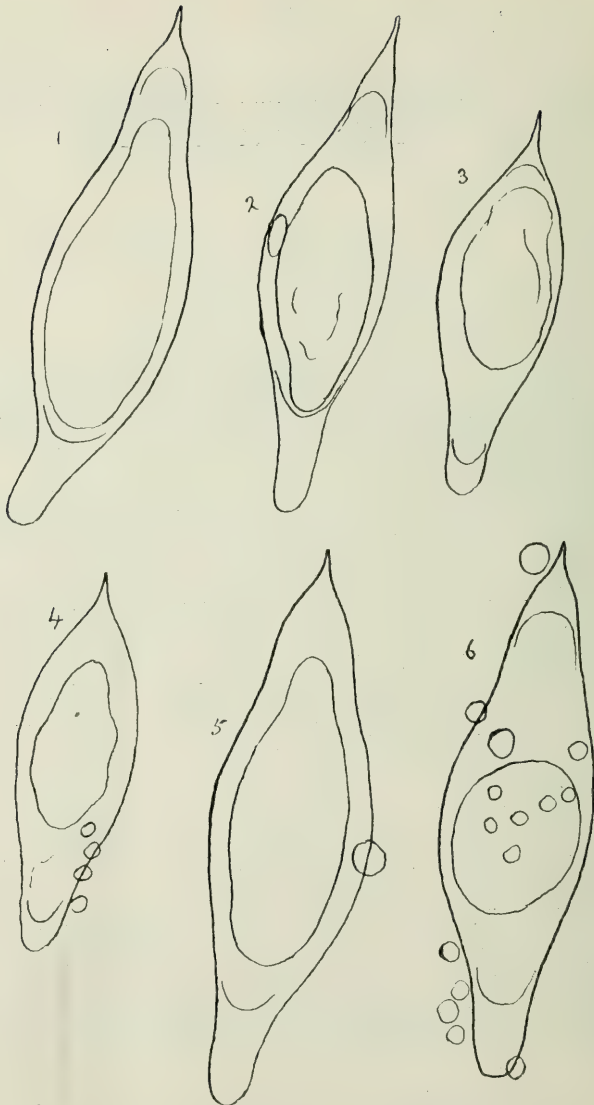


FIG. 1. Ova from urine of Natal boy. Note solid, long, rounded extremities. Average length 0.22 mm.; exceptional length 0.2625 mm.; abnormally bent end in 1. Living miracidia in 1, 2 and 5. Degenerative effects of emetine in 3, 4 and 6.

infested examples that I have found in the rivers and pools of South Africa were at least a year old. I have noted the presence of apparently mature cercariae in very small specimens from Natal rivers, and in some which were experimentally infested forty-six days before and the shells of which measured only 6.5 and 7.0 mm. in length; but it is rare to find such small specimens infested.

When required for the experiments, a number of well-developed examples, about 12 mm. in length, were selected and placed in a glass jar containing fresh water. The urine of a Bilharzia patient was then secured, and the ova collected by centrifugalising the specimen. The ova were examined microscopically, identified by

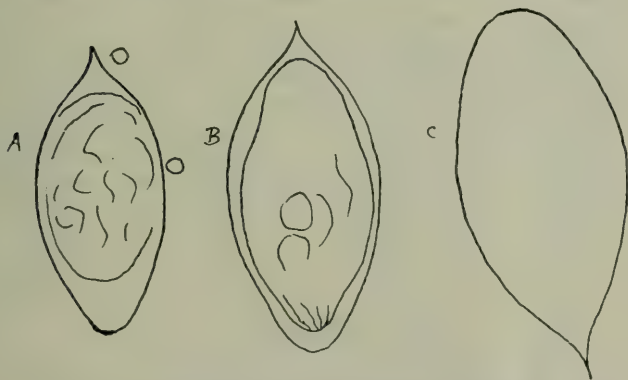


FIG. 2. Ova of *S. haematobium* from same urine, showing (B) living miracidium about to hatch, and (A) miracidium degenerated under the influence of emetine.

means of their shape, size and spine as those of *Schistosoma haematobium*, and, as soon as the contained miracidia were seen to be ready to hatch, were emptied into the jar containing the snails and placed in a good light for a few hours. At the end of twenty-four hours the snails were then generally placed in a small wooden tub.

Some of the snails which had been thus exposed to infestation were placed in some dark glass jars containing a few decomposing leaves. The water in these jars were continually replaced by drops

from a glass tubing connected with a large tub containing water-weeds. Whilst the snails were thus continually receiving fresh water laden with food, the water was gradually escaping through a regulated syphon tube. This arrangement answered well for a few snails at a time.

Long spindle-shaped ova resembling those of *Schistosomum bovis* were found in the urine of two Natal-born Indian boys, associated with the typical ova of *Schistosoma haematobium*. Both varieties were added to water containing *Physopsis* which had been kept free from all other possible chances of infection by miracidia.

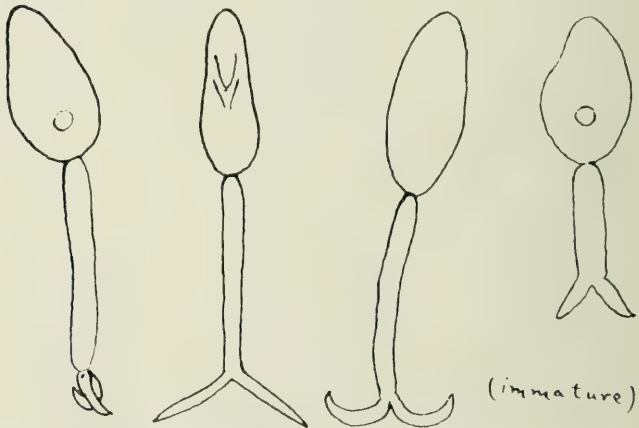


FIG. 3. Cercariae present in *Physopsis africana* 63 days after being exposed to the above ova. ($\times 2$.)

To imitate natural conditions, as far as possible, it is necessary to wait until cercariae are escaping into the surrounding water before using them for the experimental infection of animals. Although I have found apparently mature cercariae in *Physopsis* which has been exposed to miracidia only a fortnight before, I have never found the cercaria outside a snail until the development has been allowed to progress for thirty-five days, and it is probably better to keep the infested snails living for several months before dissecting them.

To ascertain whether the experimental infestation has been

successful in specimens one does not wish to destroy, it is best, as Dr. J. G. Becker once pointed out to me, to place individual snails in clean test-tubes in a good light, or even break off a minute portion of the shell over the liver. There may be certain conditions in the surrounding medium that encourage the mature cercariae to work their way out of the infested snail; but I have carefully examined specimens for several days, up to the sixty-fourth day, without any sign of free-swimming cercariae, when dissection revealed the presence of a number of mature cercariae within the liver substance.

Among about thirty individuals that I have found infested with schistosomes within one or two months after being exposed to the ova of *Schistosoma haematobium* and those resembling *S. bovis*, I have never seen any cercaria which shows eye-spots, development in rediae or possessing the long prongs that some of the schistosomes that I have found in *Physopsis* in the Natal rivers occasionally do. In every instance, when mature, the experimentally produced cercaria in *Physopsis* exposed to infection from the urine of a Bilharzia patient was 0.525 mm. in total length, possessed prongs which were about a quarter the length of the tail, and in other respects resembled the cercaria of *S. haematobium*.

REFERENCES

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